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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,867	09/09/2003	Kang-wook Park	SAM-0460	2097
7590	02/10/2005		EXAMINER LEWIS, MONICA	
Steven M. Mills MILLS & ONELLO LLP Suite 605 Eleven Beacon Street Boston, MA 02108			ART UNIT	PAPER NUMBER
			2822	
DATE MAILED: 02/10/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/657,867	Applicant(s)  PARK ET AL.	
	Examiner Monica Lewis	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 11-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☒ Claim(s) 10 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>9/03; 12/04</u> . | 6) <input type="checkbox"/> Other: _____  |

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### **DETAILED ACTION**

1. This action is in response to the election filed November 22, 2004.

#### ***Election/Restrictions***

2. Applicant's election without traverse of Group I in the reply filed on 11/22/04 is acknowledged.

#### ***Specification***

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

#### ***Drawings***

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following must be shown or the feature(s) canceled from the claim(s): a) a first base semiconductor layer...which extends from the upper surface of the collector region to the upper surface of the isolation region (See Claim 1). The drawings disclose that the collector and isolation region are located at the same level. Therefore, how can the first base semiconductor layer extend from the upper surface of the collector region to the upper surface of the isolation region. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure

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must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Claim Objections*

5. Claim 5 is objected to because it appears that the dependency is incorrect. It states "further comprising a second SIC region." However, claim 1 does not have a first SIC region instead it is disclosed in claim 4. Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3 and 6 are rejected under 35 U.S.C. 103(a) as obvious over Ryum et al. (U.S. Publication No. 2002/0058388) in view of Arai (U.S. Publication No. 2004/023526).

In regards to claim 1, Ryum et al. ("Ryum") discloses the following:

a) a semiconductor substrate (1) of a first conductivity type (For Example: See Figure 3a);

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b) a collector region (11) of a second conductivity type, which is defined by isolation regions (17) on the semiconductor substrate (For Example: See Figure 3a);

c) a first base (21b) semiconductor layer of the first conductivity type formed of a silicon germanium (SiGe) layer, which extends from the upper surface of the collector region to the upper surface of the isolation regions (Note: Although the prior art does not specifically disclose extends from the upper surface of the collector region to the upper surface of the isolation regions, it does disclose the base layer and isolation layer at the same level as disclosed in Applicant's invention. The base layer "extends" from both layers as disclosed in Applicant's invention.) (For Example: See Figure 3a);

d) an emitter region (35) of the second conductivity type formed on the first base semiconductor layer to contact the first base semiconductor layer in a region which is defined by emitter insulating layers (37) formed on the first base semiconductor layer (For Example: See Figure 3a and Figure 3c);

e) second base semiconductor layers (21a) of the first conductivity type formed of a silicon layer, which is formed on the portions of the first base semiconductor layer except for the portions having the emitter region and the emitter insulating layers (For Example: See Figure 3a);

f) an emitter electrode (39) formed on the emitter region (For Example: See Figure 3c); and

g) base electrodes (29) formed on the second base semiconductor layers at both sides of the emitter electrode (For Example: See Figure 3b).

In regards to claim 1, Ryum fails to disclose the following:

a) a base ohmic layers formed on the second base layers.

However, Arai discloses the use a base ohmic layer (15) on base layer (14B) (For Example: See Figure 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of a base ohmic layer on base layer as disclosed in Arai because it aids in reducing base resistance (For Example: See Paragraph 90).

Additionally, since Ryum and Arai are both from the same field of endeavor, the purpose disclosed by Arai would have been recognized in the pertinent art of Ryum.

In regards to claim 2, Ryum fails to disclose the following:

- a) the second base semiconductor layers are formed of an epitaxial growing layer.

Finally, the following limitation makes it a product by process claim: a) "second base semiconductor layers are formed of an epitaxial growing layer." The MPEP § 2113, states, "Even though product -by[-] process claims are limited by and defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985)(citations omitted).

A "*product by process*" claim is directed to the product per se, no matter how actually made, *In re Hirao and Sato et al.*, 190 USPQ 15 at 17 (CCPA 1976) (footnote 3). See also *In re Brown and Saffer*, 173 USPQ 685 (CCPA 1972); *In re Luck and Gainer*, 177 USPQ 523 (CCPA 1973); *In re Fessmann*, 180 USPQ 324 (CCPA 1974); and *In re Marosi et al.*, 218 USPQ 289 (CAFC 1983) final product per se which must be determined in a "*product by, all of*" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "*product by process*" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear.

In regards to claim 3, Ryum discloses the following:

- a) the first conductivity type is p type and the second conductivity type is n-type (For Example: See Figure 3).

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In regards to claim 6, Ryum fails to disclose the following:

a) a base ohmic layers are formed of metal silicide.

However, Arai discloses the use a base ohmic layer (15) made of metal silicide (For Example: See Paragraph 80). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of a base ohmic layer made of metal silicide as disclosed in Arai because it aids in reducing base resistance (For Example: See Paragraph 90).

Additionally, since Ryum and Arai are both from the same field of endeavor, the purpose disclosed by Arai would have been recognized in the pertinent art of Ryum.

8. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as obvious over Ryum et al. (U.S. Publication No. 2002/0058388) in view of Arai (U.S. Publication No. 2004/023526) and Kameyama (U.S. Patent No. 5,183,768).

In regards to claim 4, Ryum fails to disclose the following:

a) first selectively ion implanted collector (SIC) regions of the second conductivity type, which are formed at portions near the surface of the collector region and adjacent to the isolation regions.

However, Kameyama et al. ("Kameyama") discloses the use of a SIC region of a second conductivity type (120A) which are formed at portions near the surface of the collector region (104) and adjacent to the isolation regions (106) (For Example: See Figure 4d). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of a SIC region as disclosed in Kameyama because it aids in improving the speed of the transistor (For Example: See Column 1 Lines 32-37).

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Additionally, since Ryum and Kameyama are both from the same field of endeavor, the purpose disclosed by Kameyama would have been recognized in the pertinent art of Ryum.

In regards to claim 5, Ryum fails to disclose the following:

a) a second SIC region of the second conductivity type, which is formed in a portion of the collector region under the emitter region.

However, Kameyama discloses the use of a second SIC region (120B) of a second conductivity type formed in a portion of the collector region under the emitter region (140A) (For Example: See Figure 4d). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of a SIC region as disclosed in Kameyama because it aids in improving the speed of the transistor (For Example: See Column 1 Lines 32-37).

Additionally, since Ryum and Kameyama are both from the same field of endeavor, the purpose disclosed by Kameyama would have been recognized in the pertinent art of Ryum.

9. Claim 7 is rejected under 35 U.S.C. 103(a) as obvious over Ryum et al. (U.S. Publication No. 2002/0058388) in view of Arai (U.S. Publication No. 2004/023526) and Josquin (U.S. Patent No. 5,023,192).

In regards to claim 7, Ryum fails to disclose the following:

a) the base ohmic layers are formed of one of titanium silicide and cobalt silicide.

However, Josquin et al. ("Josquin") discloses the use of base ohmic layers formed of one of titanium silicide and cobalt silicide (For Example: See Column 7 Lines 52-54). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of titanium silicide and cobalt silicide as disclosed



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in Josquin because it aids in improving ohmic contact (For Example: See Column 7 Lines 52-54).

Additionally, since Ryum and Josquin are both from the same field of endeavor, the purpose disclosed by Josquin would have been recognized in the pertinent art of Ryum.

10. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as obvious over Ryum et al. (U.S. Publication No. 2002/0058388) in view of Arai (U.S. Publication No. 2004/023526) and Ryum et al. (U.S. Patent No. 5,798,277).

In regards to claim 8, Ryum fails to disclose the following:

a) insulating layers formed between the isolation regions and the first base semiconductor layer, under the base electrodes.

However, Ryum et al. ("Ryum") discloses the use of insulating layers (12 and 13) formed between the isolation regions (3) and the first base semiconductor layer (19), under the base electrodes (For Example: See Figure 4). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of insulating layers as disclosed in Ryum because it aids in enhancing the reliability of the device (For Example: See Column 6 Lines 16-20).

Additionally, since Ryum and Ryum are both from the same field of endeavor, the purpose disclosed by Ryum would have been recognized in the pertinent art of Ryum.

In regards to claim 9, Ryum fails to disclose the following:

a) insulating layers are formed of one of oxide layers and nitride layers.

However, Ryum discloses the use of oxide and nitride layers (For Example: See Column 6 Lines 16-20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Ryum to include the use of oxide

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and nitride layers as disclosed in Ryum because it aids in enhancing the reliability of the device (For Example: See Column 6 Lines 16-20).

Additionally, since Ryum and Ryum are both from the same field of endeavor, the purpose disclosed by Ryum would have been recognized in the pertinent art of Ryum.


***Allowable Subject Matter***

11. Claim 10 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML  
February 5, 2005



**Mary Wilczewski**  
**Primary Examiner**